

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A method of decoding a multidimensional symbol, the method comprising the steps of:

receiving a plurality of signal vectors $y_1...y_k$ into a sub-optimal decoder and

generating an estimated transmitted multidimensional symbol \tilde{S} therefrom;

decoding the estimated transmitted symbol vector \tilde{S} via hierarchical subset decoding and determining a subset therefrom;

generating a reduced search space V associated with the subset; and

decoding the plurality of signal vectors $y_1...y_k$ via minimum distance decoding using the reduced search space V ~~in order to obtain one of the following: the estimated transmitted multidimensional symbol \hat{S} in space V , soft bit information, hard bit information.~~

2. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ generating a reduced search space V comprising generating the reduced search space V by minimizing a metric.

3. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ generating a reduced search space V associated with the subset comprising generating at the reduced search space by minimizing a metric corresponding to the subset prior to generation of the subset.

4. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ receiving the plurality of signal vectors $y_1...y_k$ into the sub-optimal decoder and generating an estimated transmitted multidimensional symbol \tilde{S} therefrom ~~further comprising~~ receiving the plurality of signal vectors $y_1...y_k$ into a the sub-optimal decoder and generating soft bit information therefrom.

5. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ decoding the received ~~the~~ plurality of signal vectors $y_1...y_k$ via minimum distance decoding using the reduced search space V ~~and generating a multidimensional symbol \hat{S} therefrom~~ ~~further comprising~~ decoding the received plurality of signal vectors $y_1...y_k$ via minimum distance decoding using the reduced search space V and generating a multidimensional symbol \hat{S} in space V therefrom.

6. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ receiving a plurality of signal vectors $y_1...y_k$ into a sub-optimal decoder and generating an estimated transmitted multidimensional symbol vector \tilde{S} therefrom ~~comprising~~ receiving the plurality of signal vectors $y_1...y_k$ into an interference cancellation decoder and generating the estimated transmitted symbol vector \tilde{S} therefrom.

7. (Original) The method according to claim 6, wherein the interference cancellation decoder is selected from the group consisting of a successive interference cancellation decoder, and a parallel interference cancellation decoder.

8. (Currently Amended) The method according to claim 1 wherein ~~the step of~~ receiving a plurality of signal vectors $y_1...y_k$ into a suboptimal decoder ~~an ordered or unordered linear decoder~~ and generating an estimated transmitted

multidimensional symbol vector \tilde{S} therefrom comprising receiving the plurality of signal vectors y_1, \dots, y_k into an ordered or unordered linear decoder ~~suboptimal decoder~~ and generating the estimated transmitted multidimensional symbol vector \tilde{S} therefrom.

9. (Currently Amended) The method according to claim 8, wherein the linear decoder consists of a decoder selected from the group consisting of a zero forcing decoder, a MMSE decoder, and a matched filter ~~receiver~~decoder.

10. (Original) The method according to claim 1, wherein the multidimensional transmitted symbol \hat{S} is represented by the relationship

$$\hat{S} = \arg \min_{v \in P} m(y_1, \dots, y_k, v), \text{ and wherein } m \text{ is any metric.}$$

11. (Currently Amended) The method according to claim 1, wherein ~~the step of decoding the estimated transmitted symbol vector \tilde{S} via hierarchical subset decoding and determining a subset therefrom comprises the steps of:~~

defining a hierarchical subset as an ordered set of subsets that cover a multidimensional constellation, wherein the hierarchical subsets are ordered such that if R_k is a subset of the multidimensional signal space that the signal is detected to lie within at some step k , it ~~can be further derived~~said R_k subset is derived into subsets $\{R_{\{n,1\}}, \dots, R_{\{n,L\}}\}$ such that the union of these subsets spans R_k ; and

decoding the received symbol vectors over the subset R_k using a desired distance.

12. (Currently Amended) The method according to claim 11, wherein the ~~given~~ multidimensional symbol is detected to lie within R_k at some step k the receiver ~~can further determine~~determines whether the multidimensional

symbol lies in one of the subsets $\{R_{[1]}, \dots, R_{[L]}\}$ by computing the Euclidean distance between the received symbol vector and the center of each of the subsets.

13. (Cancelled).